

**ATTACHMENT FIVE**  
**TRUEPOSITION'S AUSTIN AND FRISCO, TX TEST REPORT**



PIONEERING LOCATION SOLUTIONS FOR A SAFER WORLD

TruePosition®

E911 Indoor Location Accuracy®

- Testing in Manhattan
- Indoor Testing Summary
- Comparison testing in Austin and Frisco TX

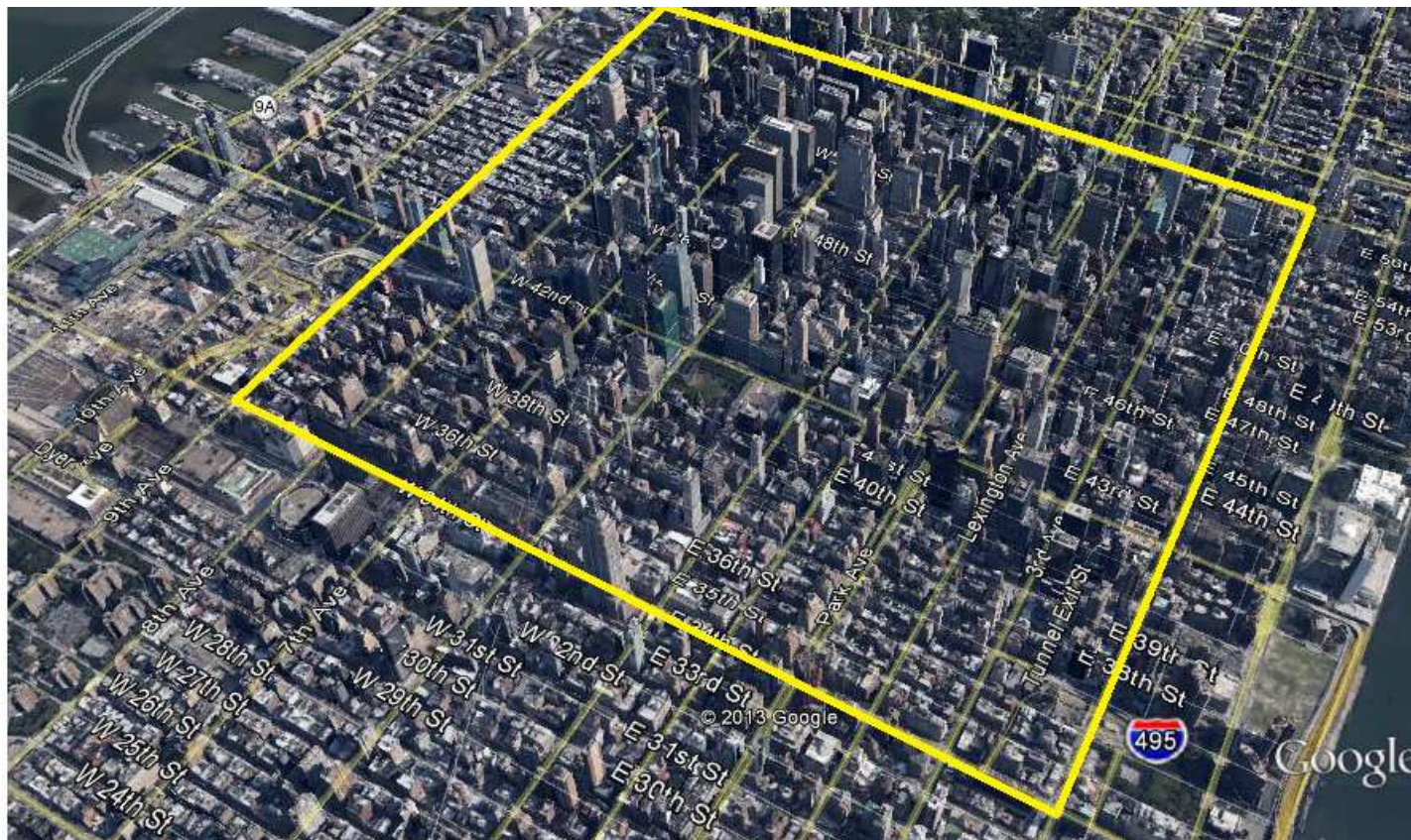
# Manhattan Testing

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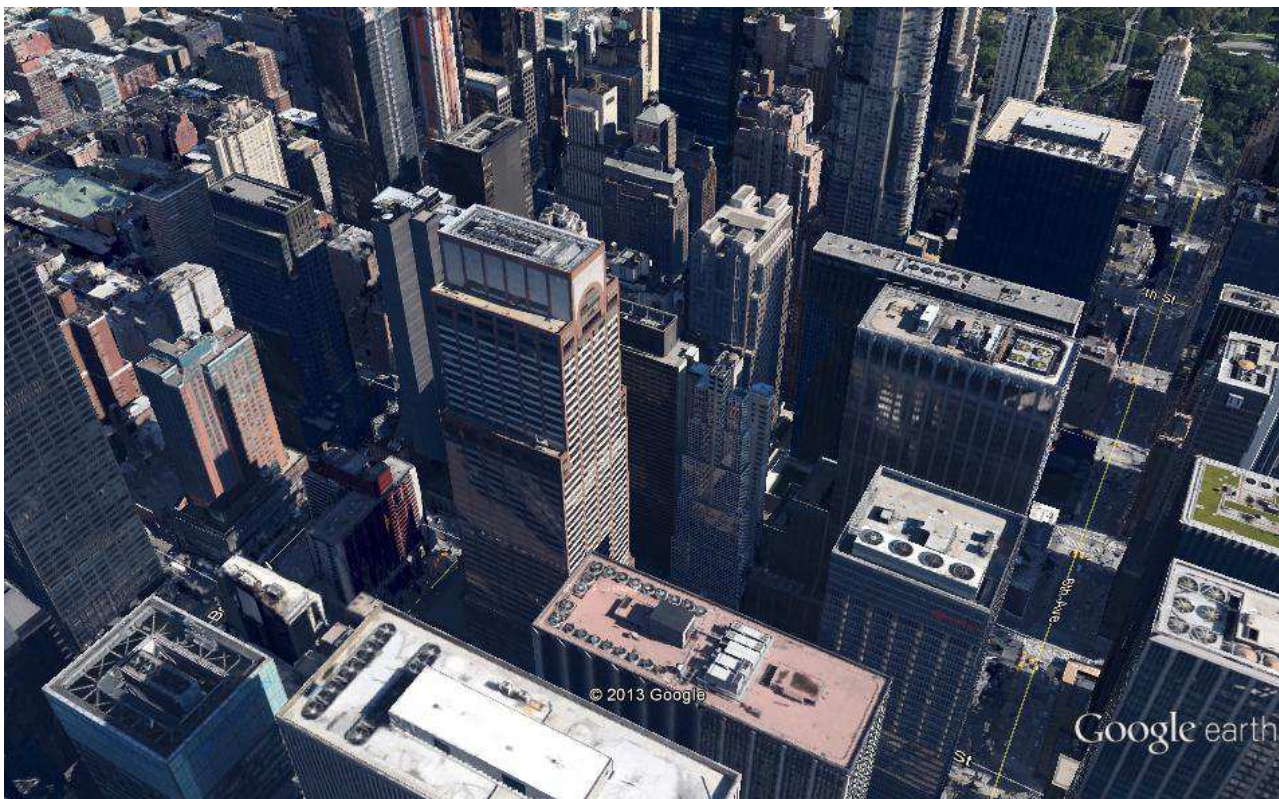


- Conducted fall of 2000
- Tested TruePosition U-TDOA technology, same technology operating today
- Test conducted on Verizon network in mid town Manhattan by independent Verizon Labs
- Followed methodology equivalent to CSRIC test plan
- Dense urban area – similar to dense urban area in San Francisco
- Many story concrete, steel, glass buildings

# Manhattan Test Area



## Dense Urban Area - Manhattan



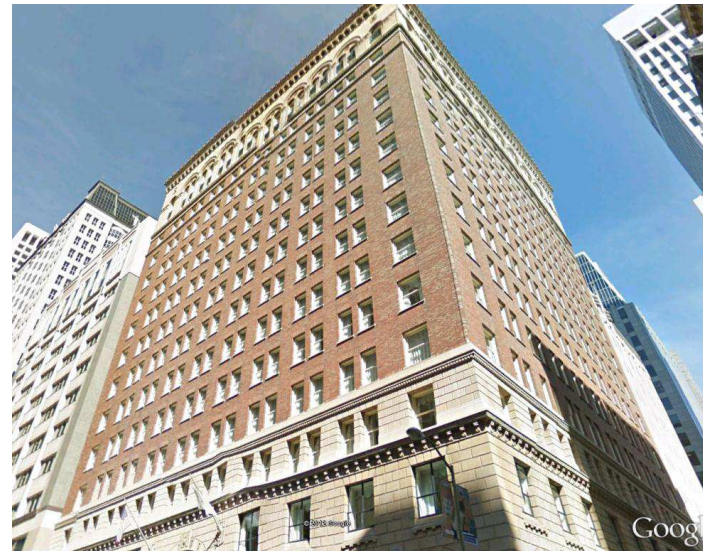
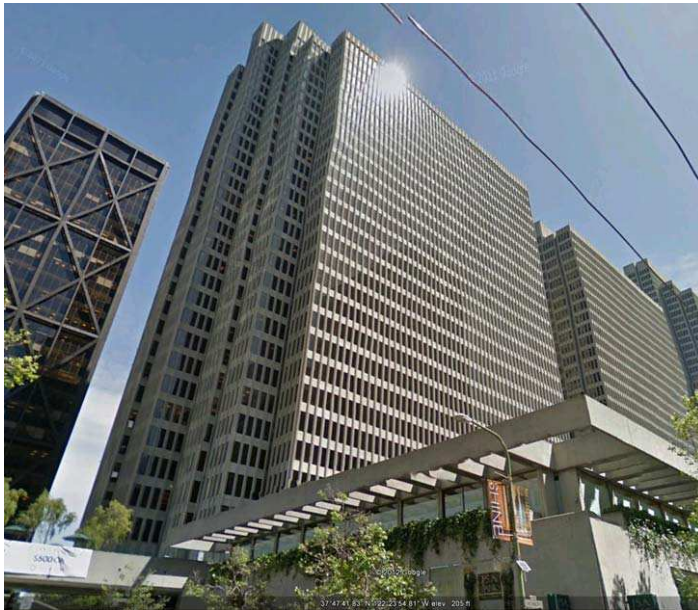
## Dense Urban Area – San Francisco



## Sample Dense Urban Buildings - Manhattan



# Sample Urban Test Buildings – San Francisco



# Similar Test Point Distribution in Buildings

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- Manhattan
  - Tests points selected on ground floor and top floor
  - On each floor, 3 test points selected
    - Exterior room (with window)
    - Interior room
    - Building core (near elevator)
- San Francisco example – Building 1
  - TP1: In lobby bar (deep indoors)
  - TP2: 4th floor interior corridor
  - TP3: 31st floor, end of corridor, near window
  - TP4: 8 floor side corridor, near window

# Manhattan Exterior Room Examples



Exterior Room Top Floor  
U-10



Exterior Room Ground  
Floor U-12



# Manhattan Interior Room Examples

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Interior Room Top Floor  
U-13



Interior Room Ground  
Floor U-15



# Manhattan Building Core Examples



Building Core Top Floor  
U-16



Building Core Ground  
Floor U-18



## Manhattan Dense Urban Indoor Results



		67%	95%
U10	Exterior room, top floor	92	120
U12	Exterior room, ground floor	84	202
U13	Interior room, top floor	87	125
U15	Interior room, ground floor	67	208
U16	Building Core, top floor	99	129
U18	Building Core, ground floor	120	204
Average across urban canyon indoor scenarios		92	165

# Indoor Testing Summary

## Accuracy and Yield Comparison Dense Urban



- Based on CSRIC testing in San Francisco, and Verizon testing in Manhattan

	67%	90%	95%	Yield
NextNav	57.1	102.4	154	93.90%
Polaris	116.7	400.1	569.3	99.40%
Qualcomm	155.8	267.5	328.1	85.80%
TruePosition	92	150	165	99%

- NextNav and TruePosition had good accuracy
- Polaris and TruePosition had good yield

## Accuracy and Yield Comparison

- Based on CSRIC testing in San Francisco and TechnoCom testing with CSRIC based plan in Wilmington
- Urban Comparison

	67%	90%	95%	Yield
NextNav	62.8	141.1	196.1	95.40%
Polaris	198.4	447.8	729.9	99.90%
Qualcomm	226.8	449.3	507.1	90.80%
TruePosition	87.3	140.7	163.2	100

- NextNav and TruePosition had good accuracy, but NextNav had several failed attempts which were not included in accuracy results
- Polaris and TruePosition had good yield

## Accuracy and Yield Comparison Suburban



	67%	90%	95%	Yield
NextNav	28.6	52.9	62.2	100.00%
Polaris	232.1	420.7	571.4	99.80%
Qualcomm	75.1	204.8	295.7	91.40%
TruePosition	66.1	116.2	163	100

- NextNav and TruePosition had good accuracy and yield
- Polaris has very poor accuracy
- Qualcomm fails a significant portion of attempts

AGPS/AFLT or AGPS/RTT is not Sufficient

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## PSAP Testing in Frisco and Austin, TX

# Test Methodology

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- Goal: Test real world accuracy of Current E911 deployed Technologies
- Parameters:
  - Off-the-shelf phones
  - Three air interfaces - Three location technologies
    - U-TDOA on GSM
    - A-GPS/AFLT on CDMA
    - A-GPS/RTT on UMTS
  - Conducted Fall 2010
- Real world testing conducted in two PSAP areas of Texas
  - Frisco: Suburban
  - Austin: Urban, campus (U of Texas)

# Test Methodology

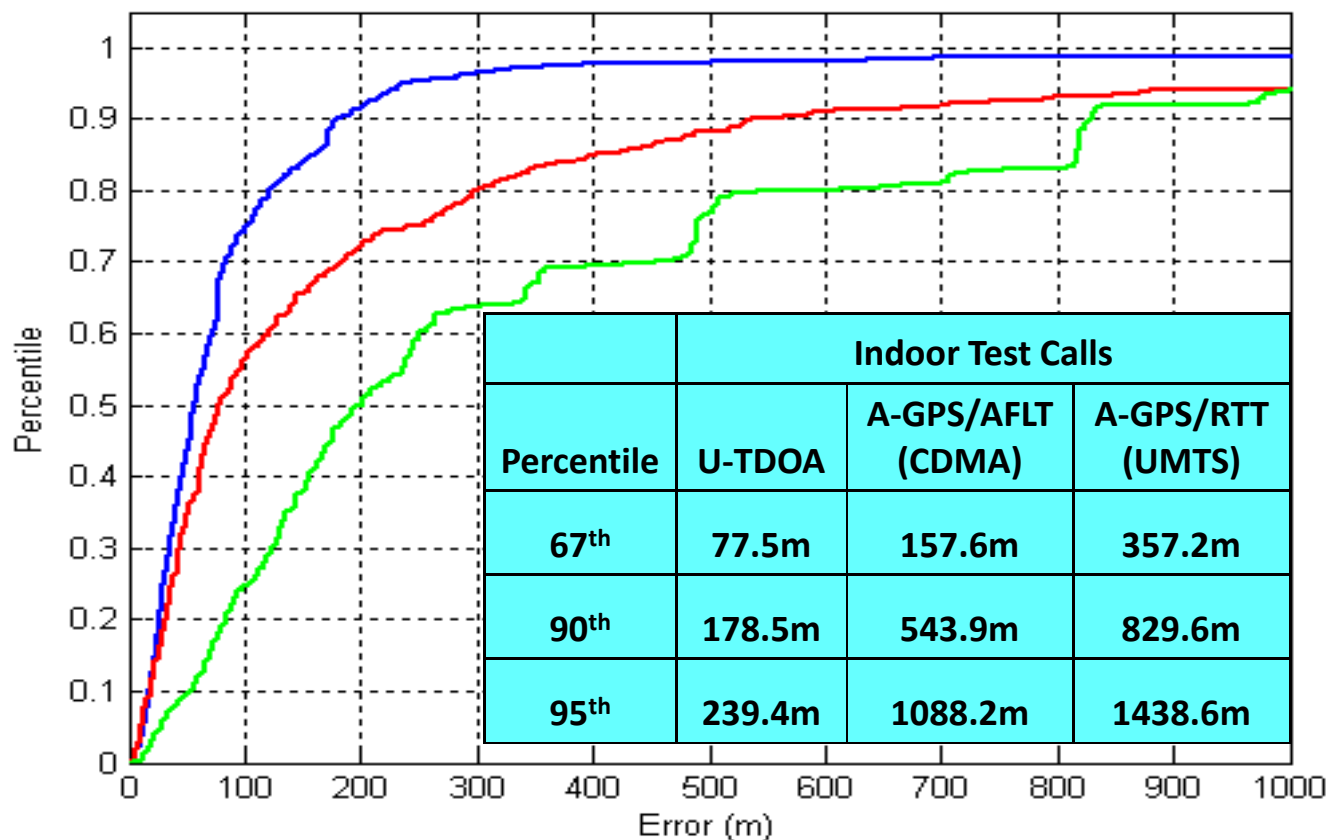
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- Over 3500 real 911 calls made to local PSAPs
  - At least ten calls from each test point
  - At least three iterations of calls at each test point
  - Concrete, steel, glass buildings for indoor testing
  - Suburban area of Frisco and Downtown Austin-University of Texas Campus
- Test point selection
  - Both indoor and outdoor test points
  - Chosen test points around city provide reasonable representation of subscriber use
  - Ground truth determined prior to test execution.
- Daily export of PSAP database allowed post-processing to determine error of each test call at each point

# Indoor Results - Current E911 Technologies



Texas PSAPs - Indoor Calls [Blue-UTDOA; Red-AGPS/AFLT(CDMA); Green-AGPS(UMTS)]



# Summary

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- Location technologies deployed today can reliably and accurately locate E911 calls from indoor locations
- Wireless operators are increasingly relying on GPS based solutions, such as AGPS + AFLT and AGPS + RTT, which do not work indoors
- The FCC now has enough information about indoor location technologies to move forward to solve the increasing problem of inadequate indoor location coverage

## **CERTIFICATE OF SERVICE**

I hereby certify that on this 6<sup>th</sup> day of August, 2013, a true and correct copy of the foregoing document was served by electronic service on the following:

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